RECLAMATION

Managing Water in the West

Dam Safety Program

Managing Risk to Support the Core Mission

U.S. Department of the Interior
Bureau of Reclamation

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Dam Safety Related Legislation

- National Dam Inspection Act (1972)
- Reclamation Safety of Dam Act (1978)
- Reclamation Safety of Dams Act Amendment (1984)
- National Dam Safety Program Act
- Dam Safety and Security Act of 2002
- Reclamation Safety of Dams Act Amendment (2004)

Reclamation Safety of Dams Act of 1978

" In order to preserve the structural safety of Bureau of Reclamation dams and related facilities, the Secretary of the Interior is authorized to perform such modifications as he determines to be reasonably required. "

Safety of Dams Act of 1978

- Authorizes modification of Reclamation dams "the cause of which results from new hydrologic or seismic data or changes in the state of the art criteria…deemed necessary for safety purposes"
- Does not address conditions "resulting from age and normal deterioration or from nonperformance of reasonable maintenance"
- 82 dams repaired to date under Safety of Dams Act

- Safety of Dams
  - New hydrologic data
  - New seismic data
  - Change in the State-of-the-art

- O&M
  - Normal deterioration
  - Lack of maintenance
  - Ensure reliable operation
  - Personnel and public safety

Missions

Reclamation's Mission

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American Public. Reclamation is responsible for reliably delivering water and power to its stakeholders.

Dam Safety's Mission

The mission of Reclamation's Dam Safety Program is "To ensure that Reclamation facilities do not present unreasonable risks to the public, public safety, property, and/or the environment."

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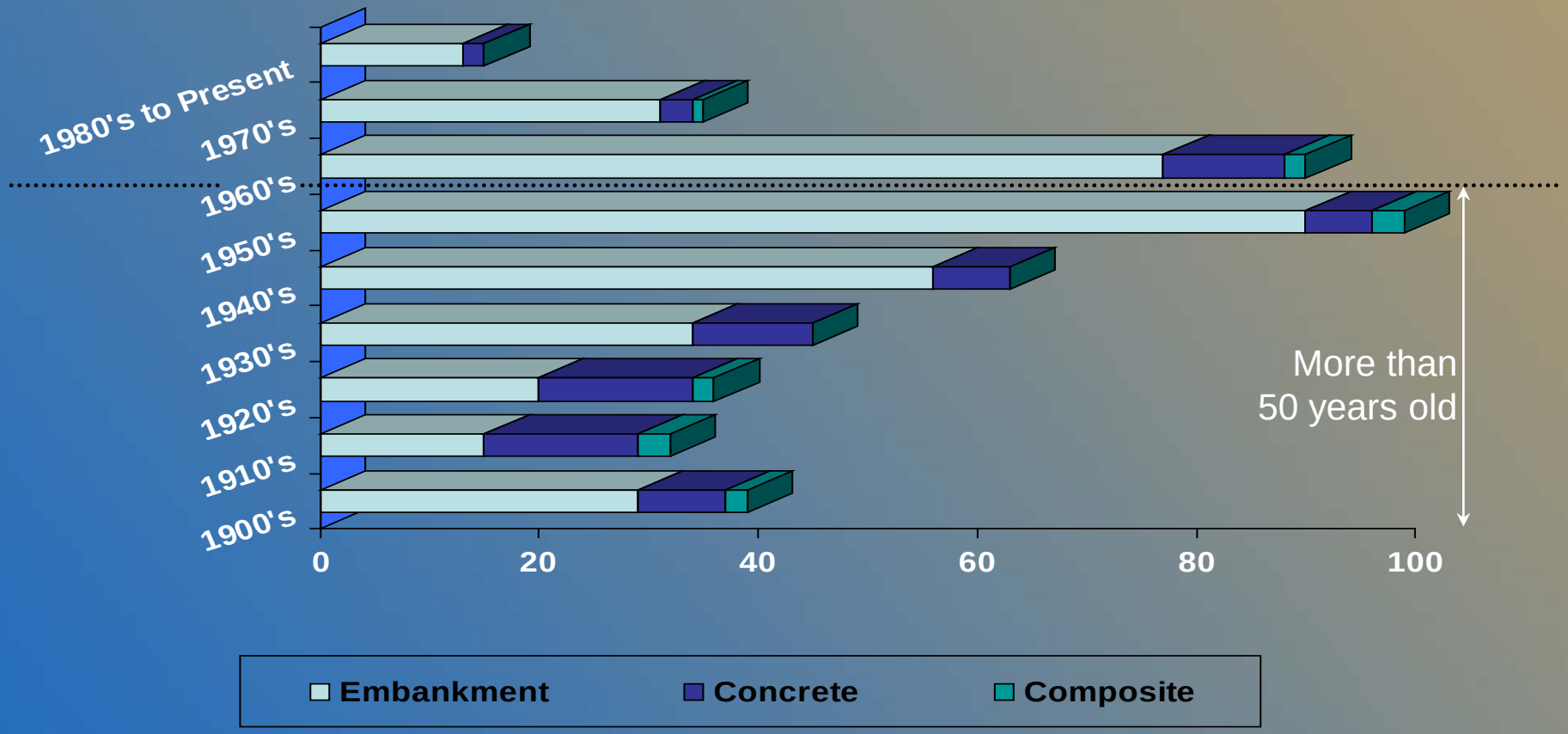
Inventoried dams and dikes

High and Significant-hazard	370
Low-hazard	106
TOTAL	476

Bureau of Reclamation

Original Construction Dates



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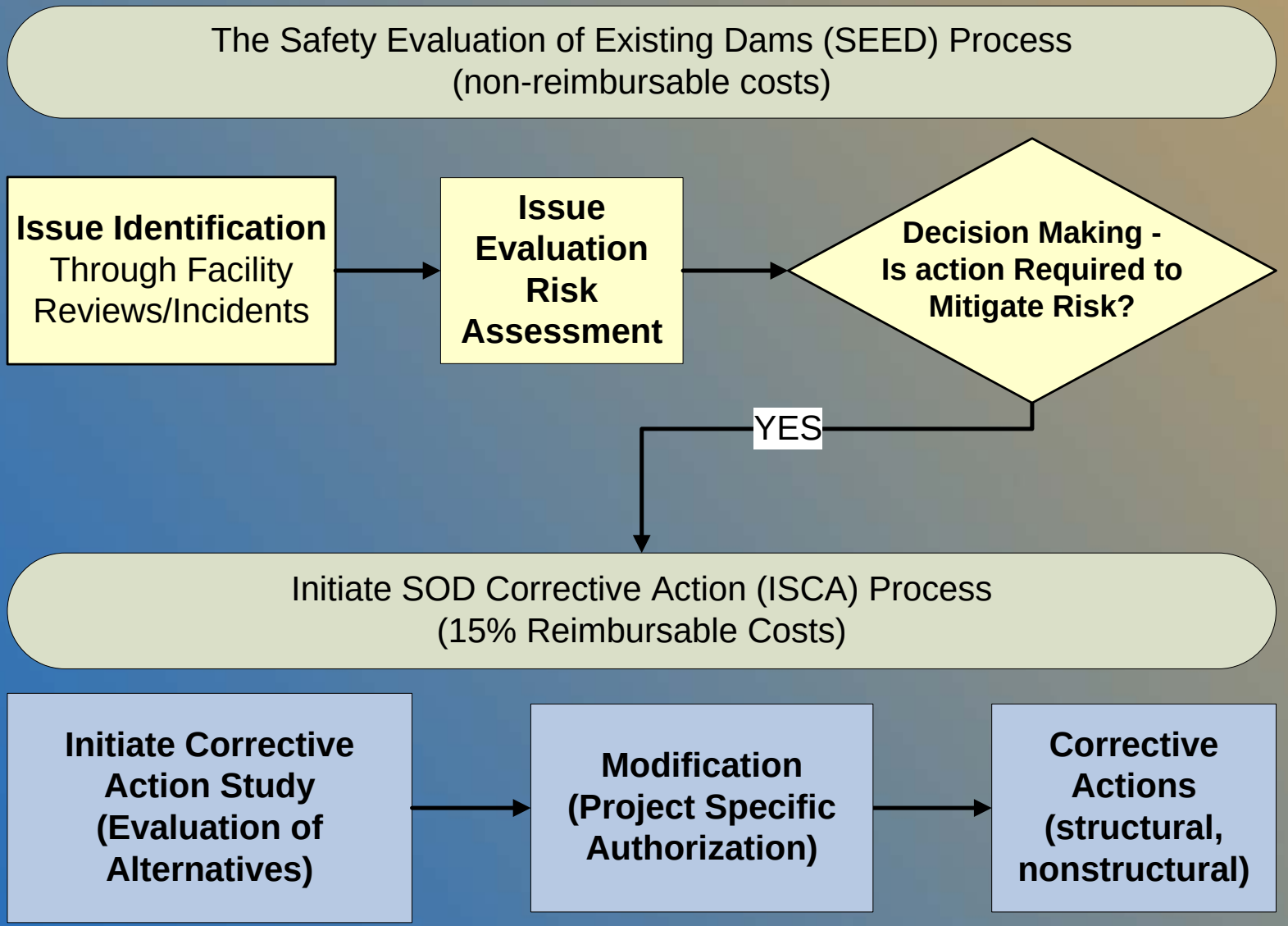
Dam Safety Program

- **SEED** – Safety Evaluation of Existing Structures (Risk identification and evaluation)
- **ISCA** – Initiate SOD Corrective Action (Risk reduction)
- **DOI** – Commissioner's responsibilities under Part 753 of the Departmental Manual

Dam Safety Program – Overall Process



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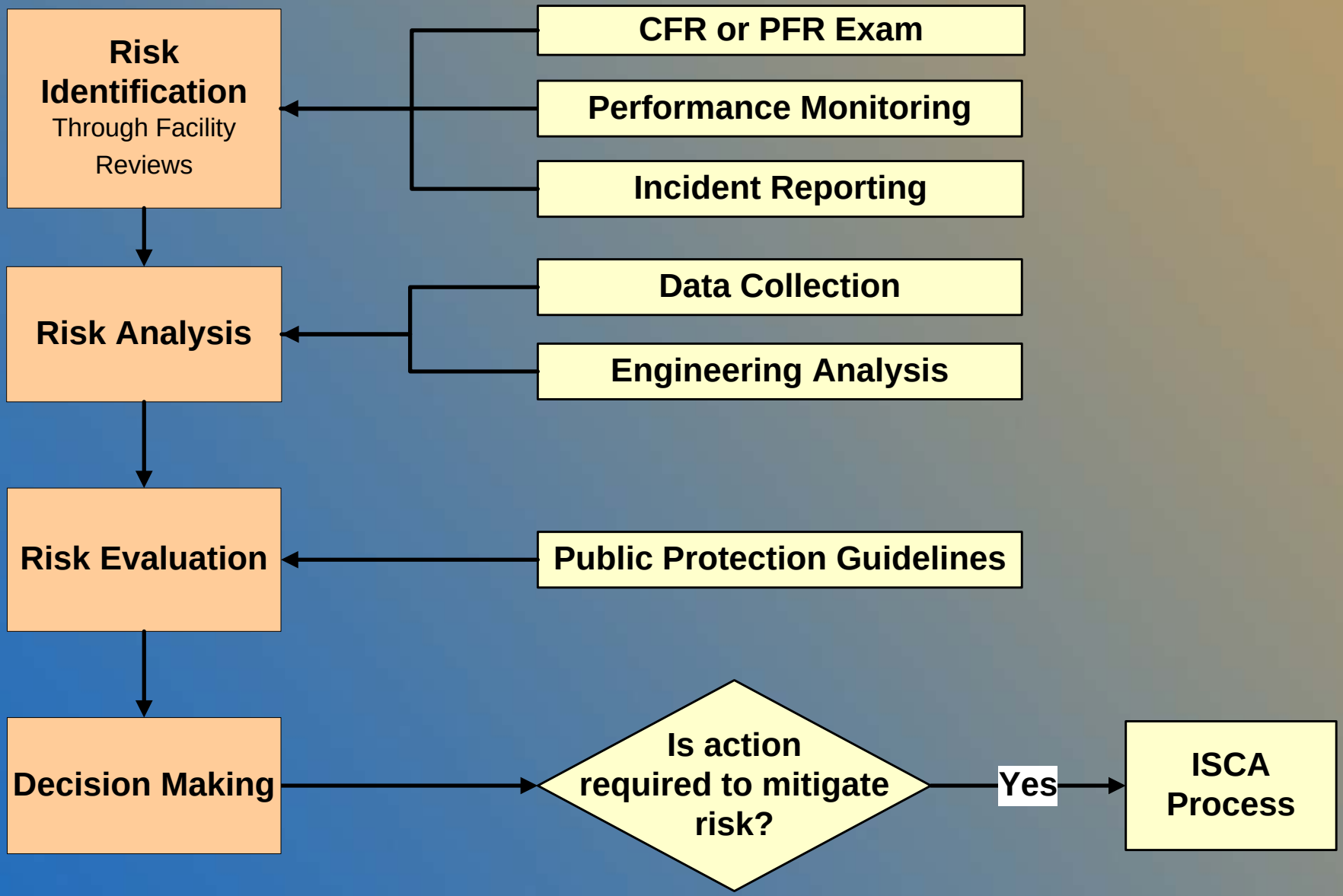
Dam Safety Program – Safety Evaluation of Existing Dams (SEED) Process



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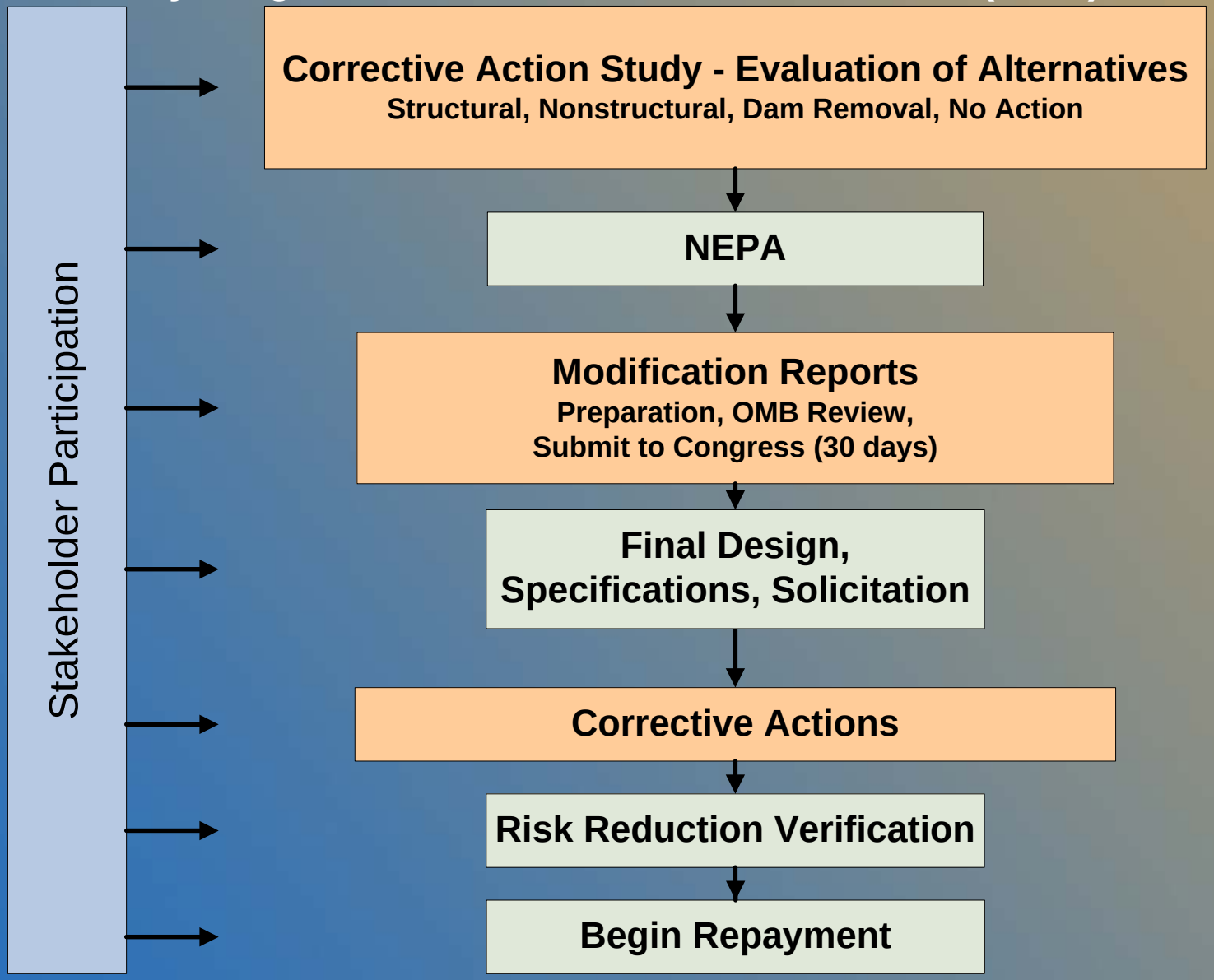
Dam Safety Program – Initiate SOD Corrective Action (ISCA) Process



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SOD Modification Report Process

- Certification
- Commissioner's Briefing
- OMB Review
- 30 days in Congress

  - Alternatives
    - No action
      - Not acceptable
    - Operational
    - Deactivation
    - Modification
    - Combination

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Risk

Annualized failure probability

- P (failure) = P (load) x P (response)

Annualized loss of life

- Risk = P (load) x P (response) x Consequences

P (load)

- **Floods**
- **Earthquake**
- **Static**

P (response)

- **Failure**
- **Non-failure**

Consequences

- **Loss of Life**
- **Economic**
- **Environment**
- **Cultural**

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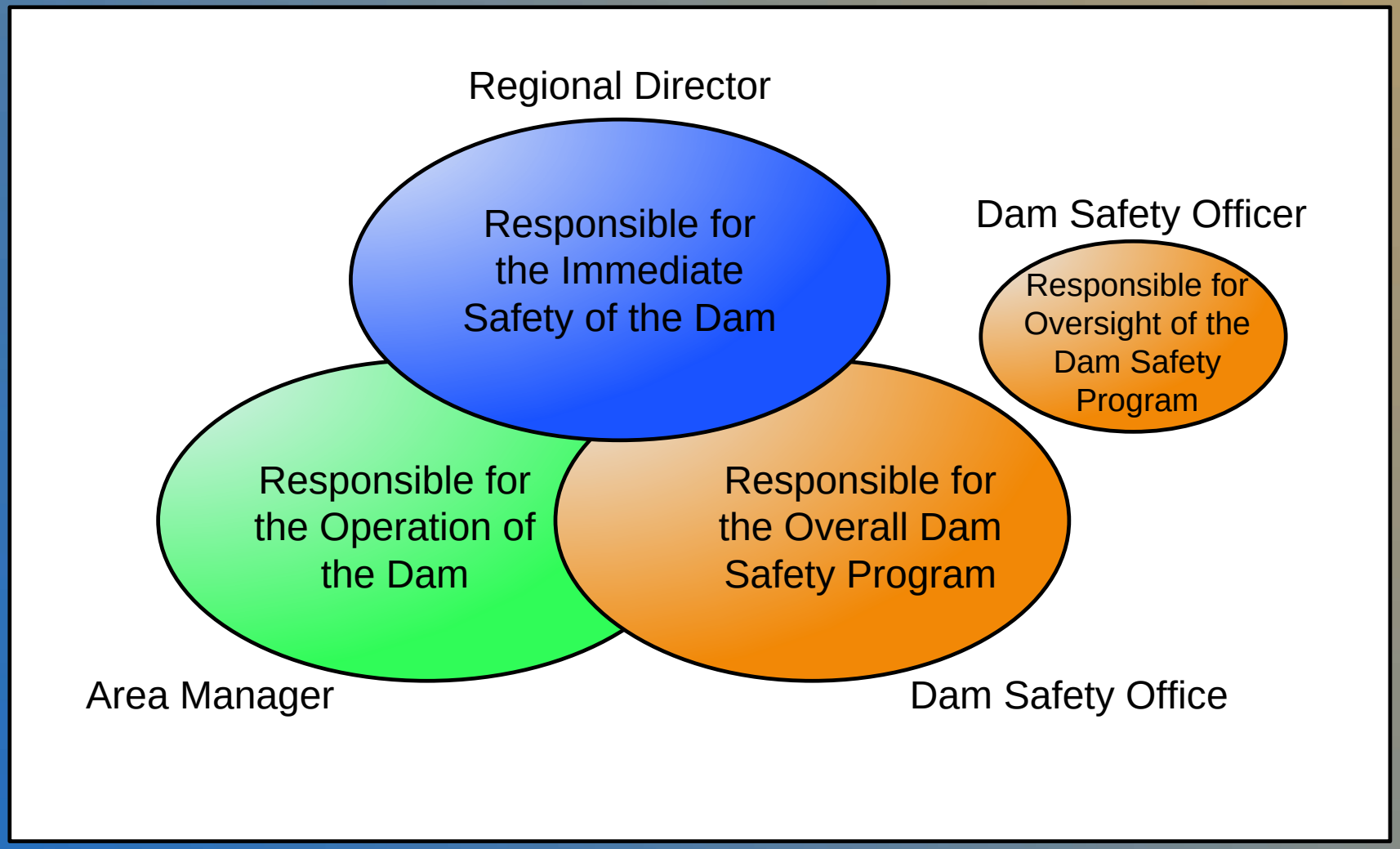
Risk Informed Decision Making

- Decisions are made using the actual risk estimate and the case made to justify the risk estimate
- This information is used to “make the case” to an internal technical advisory panel and to the decision makers
- Every decision is documented and signed by all Decision Makers

Risk Management

- Explicit use of risk assessment to inform decision making and to prioritize activities for more than 15 years.

Decisions Related to Dam Safety Issues



Types of Risk Exposure

Seepage, piping, internal erosion

- **Teton Dam failed June 1976**
- **11 killed, ½ billion dollars in property damage**

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Types of Risk Exposure

State-of-the-Art Changes

- **Spillway Uplift Forces**

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Types of Risk Exposure

Flooding, overtopping, downstream inundation

- **Frequency analysis, paleo flood data**
- **Impacts of climate change**

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Types of Risk Exposure

Earthquake imposed shaking, loading

- **Deformation**
- **Cracking**
- **Foundation liquefaction**

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Safety of Dams Modifications

- Ongoing
  - Folsom Safety of Dams/Joint Federal Project
  - Glendo Dam, Wyoming (hydrologic overtopping)
  - Guernsey Dam, Wyoming (hydrologic overtopping)
  - Echo Dam, Utah (seismic)
  - A.R. Bowman, Oregon (hydrologic overtopping)
  - Red Willow Dam, Nebraska (static)

- Planned
  - B.F. Sisk Dam, California (seismic)
  - Stampede Dam, California
  - Boca Dam, California
  - Terminal Dam, California

Safety of Dams Modifications Authorization Ceiling

- Reclamation Safety of Dams Act Amendment (2004)
  - Additional $540 Million
  - Indexed for inflation as of November 2004
  - Authority projected to 2016
  - Large projects may trigger reauthorization before 2017